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RECENT TRENDS AND PROSPECTIVE DEVELOPMENTS IN AIR SHIPMENTS OF AGRICULTURAL COMMODITIES 1/

World air freight traffic has grown sensationally, increasing more than 32 times since 1946 and more than 4 times in the past 10 years. Shippers are now spending more than $700 million yearly to send their goods by air. The volume of agricultural commodities shipped by air is still a very small part of total air shipments, but it is growing.

A recent survey by some of the major airlines shows that the volume of fresh fruits and vegetables shipped by air during July-June 1964-65 was between 4 and 5 times that during 1961. These airlines expect a similar increase by 1970. Cut flowers move in large quantities by air, making up two-fifths of the total volume of agricultural products carried by these airlines (table 5). One of the major airlines reported cut flowers as the sixth most important item it carried and fruits and vegetables as the seventh. Other horticultural products such as shrubbery, plants, ornamental greens, etc. are also moving in fairly large quantities as are poultry and eggs and miscellaneous foodstuffs.

Shipments of agricultural commodities no longer move by air only when the commodity is in short supply. During the 1965 season, the airlines transported more than 1,100 carlot equivalents of strawberries out of California, almost 50 percent more than in 1964, and about 180 carlot equivalents of other fruits and vegetables. 2/ Commodities hauled by airlines included fresh figs, cherries, peaches, cantaloupes, apricots, nectarines, plums, grapes, raspberries, asparagus, lettuce, parsley, okra, tomatoes, frozen foods, poultry, eggs, meats, seafoods, and oriental vegetables.

Air Freight Rates

Rates per ton-mile on fruits and vegetables from California dropped sharply between 1961 and 1965. In 1961 air freight rates averaged between 18 and 20 cents. 3/ A recent survey indicated that the average was about 12 cents per ton-mile in 1965 and ranged between 7 cents on fruits and berries to 20 cents on cut flowers. The reduction was partly due to more efficient operations plus the use of more cargo-carrying jets.

Air freight rates on shipments of fresh fruits and vegetables from San Francisco to Chicago and New York were 33 to 76 percent higher than railway express rates in 1965 and 3 1/2 to 4 times the comparable rail rates (table 6).

However, there are distinct advantages in shipping perishable commodities by air, which make air rates more competitive. Shorter transit time lessens spoilage, and less expensive packaging is required. Also shipping damage is apt to be less.

Volume of Shipments Increase as Rates Decrease.--Export rates for berries were 30 cents a pound (100-pounds minimum weight) in 1963; by 1965 they had been reduced to 23 cents per pound (2,200-pounds minimum weight). In 1965, berry shipments were almost 7 times those in 1963. 4/

Rates for meat from New York to London (including slaughtered poultry and game) were lowered September 1, 1965, to 17 cents per pound (2,200 pounds minimum weight). Rates on fruits and vegetables from New York to London were reduced to 16 cents per pound (1,100-pounds minimum) on January 1, 1966. Some sales managers

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1/ Prepared by Mildred R. DeWolfe, survey statistician, Marketing Economics Division, Economic Research Service, USDA.

2/ U.S. Consumer and Marketing Service, Market News Branch, Fresh Fruit and Vegetable Shipments, C&MS-14 (1964), USDA, May 1965.

3/ John H. Hunter, Jr., Marketing and Transportation Situation, November 1962.

4/ Foreign Agricultural Service, USDA, Foreign Agriculture, July 26, 1965.

Table 5.--Tonnage of agricultural products carried by 5 airlines, July 1, 1964 - June 30, 1965

Product	Quantity
	Tons
Cut flowers	14,500
Fresh fruits and vegetables	13,750
Other horticultural products	2,350
Poultry and eggs	1,750
Frozen foods	500
Miscellaneous foodstuffs	1,550
Other miscellaneous	750
Total	35,150

Table 6.--Freight rates per 100 pounds for fruits and vegetables moving by railroad, railway express and air from San Francisco to New York and Chicago, 1965

Commodity	Destination	Rail freight		Railway express		Air	
		Rate	Minimum weight	Rate	Minimum weight	Rate	Minimum weight
		Dollars	1,000 pounds	Dollars	1,000 pounds	Dollars	1,000 pounds
Peaches	Chicago	2.07	40	4.09	36	7.20	2
Peaches	New York	2.07	40	4.94	36	8.65	2
Strawberries	Chicago	2.07	40	5.28	22	7.50	3
Strawberries	New York	2.07	40	6.33	22	8.45	10
Asparagus	New York	2.02	50	4.94	36	7.30	2

feel that a more regular flow of these items can be expected in overseas airborne traffic as a result of the reductions.

One of the major airlines lowered rates in April 1964 on fruits and vegetables shipped from Los Angeles to Chicago and New York. The reductions ranged from 17 to 40 percent on the Chicago rates and 26 to 44 percent on the New York rates. In 1965, there was a 45 percent increase in California shipments of strawberries to Chicago and a 25 percent increase in shipments to New York.

Each carrier initiates its own rates. The rates are subject to the approval of the Civil Aeronautics Board. This is true for both domestic and foreign rates.

Ton-Mile Costs to Airlines

During 1964, 4-engine all-cargo jets in U.S. domestic service had average direct operating cost of 4.59 cents per available ton-mile. 5/ Average capacity per revenue

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5/ Direct Operating Costs and Other Performance Characteristics of Transport Aircraft in Airline Service, 1964. Federal Aviation Agency, Office of Policy Development, Sept. 1965. In calculating cost per available ton-mile, weight of capacity load is used.

mile was 43 tons. In international cargo operations, direct operating costs averaged 4.84 cents. Direct operating costs include such items as aircraft fuel, flight crews, depreciation, and maintenance. Ground handling costs' are not included.

Many variables must be considered when computing the average cost to the airlines of hauling 1 ton of freight 1 mile. Some of the points to be considered are: (1) Kinds of planes used, (2) cargo hauled, (3) preparation of cargo for shipment (many pieces handled individually or containerized shipment), (4) origin and destination points (a through-shipment or 1 that must be reconsigned), (5) distance hauled, and (6) need for special handling of cargo (because of fragility, prescribed temperature, humidity, etc.).

Plans for Growth

Airlines expect a substantial increase in agricultural commodity air freight during the next 5 years. Reasons given are: (1) Reduced operating costs, permitting reduced rates, (2) better use of equipment, (3) better packaging, (4) more automation, (5) additional services, (6) greater effort to improve marketing conditions, (7) improved sales promotion plans, (8) increased demand for high quality perishable products, and (9) increased service by airline customers to consumers.

Better Use of Equipment

A marketing analyst for the Boeing Company stated that a practical application of cargo jets to the short-haul market is coming. He emphasized that this will be in hauls ranging from 150 to about 400 miles. The company has designed 3 models of airplanes that will be able to operate as full-cargo planes, full passenger-planes, or part-passenger part-cargo planes. They can be converted in 20 minutes from 1 type to the other. The smallest model can exchange pallets with the largest. These planes will have the capability of accepting pallets flown in by big jets from across the country or the other side of the world. When operating as cargo planes, they will permit full mechanization of cargo handling.

All-Cargo Jets

The first all-cargo jets began to provide U.S. scheduled commercial service in 1963. As a result, cargo capacity increased sharply. By the end of 1965, U.S. carriers operated more than 40 of these giant jet freighters. A single cargo jet can haul a load of more than 40 tons nonstop coast-to-coast, or 35 tons nonstop from New York to Paris. The quick change cargo jet can be converted to an all-passenger vehicle or it can be converted to a part-cargo and part-passenger plane.

New mechanized ground-handling equipment and increased palletizing of loads now make it possible to load and unload jet freighters in 40 minutes. For transatlantic, transcontinental, and semi-transcontinental runs, the jet is much more efficient than the piston-type plane. Jets have equipment for mechanical refrigeration and for heating of cargo. Proper temperature and humidity control and packaging are necessary to maintain the quality of perishables in transit in order to justify the additional transportation cost of air freight.

According to a survey by the Air Transportation Association, U.S. scheduled airlines have on order "480 jet powered planes valued at more than $2.4 billion, or 53 percent of what the airlines paid for their entire present fleet. Most of the new planes will be in service by the end of 1967." This order includes both cargo and passenger planes. These planes will replace obsolete and uneconomical equipment.

Planes of the Near Future

What the airlines expect for the future is a supersonic plane which will travel between New York and London in less than 3 hours. The transportation cost would be about the same as it is now. Both Britian and France expect to have their jointly-developed 1,450-mile-an-hour Concorde airliner flying by 1970-71. Development of American supersonic transports appears to be 2 to 4 years behind. Plans are for the first U.S. models to fly at 1,800 miles per hour.

Airlines also foresee development of a mammoth subsonic jet. Its speed would be in the 550-mile-per-hour range--less than half that of the supersonic plane, but its increased size would result in lower cost per ton-mile.

The United States also is looking for ways to meet pressures for cheaper air transportation. Two aircraft manufacturers already have "stretched versions" of today's airliner in the works. The stretched model will have a substantial size advantage over the planes now in use. These planes could carry enough additional weight to justify charging lower rates. Two airlines have ordered several stretched jets and expect delivery in the fall of 1966.

The most striking solution to providing lower-priced air transportation would be a commercial model of the military C5A, which the Air Force will build soon. The C5A will be 230 feet long and stand 6 stories high at the tail. The largest Boeing jet now in use is about 150 feet long. The new plane is expected to be capable of carrying 50 tons nonstop across the Pacific or 125 tons about 3,200 miles--roughly the width of the Atlantic. The C5A is due to be test-flown in about 2 years. Basically, it is intended to be used as a cargo transport. The weight of the C5A and its commercial version could cause a problem on runways, although use of additional wheels to distribute the weight might handle this.

The civilian version of the military plane would be capable of carrying so much more than any plane in use that airlines might have to make joint arrangements to fill it. Probably loaded highway trailers could be loaded into this plane and pulled off at their destination.

Containers

Now that jet freighters have been successfully introduced, the air cargo industry is taking a closer look at containerization in an attempt to further reduce costs. Handling costs of air freight are closely tied with the number of pieces handled as well as the weight. The international airlines provide a discount plan of 12 percent on containerized shipments which they hope will encourage the use of containers.

During the past few years, the airlines and shippers have worked together to improve handling methods, packaging techniques, and refrigeration. They devised a pallet that can be loaded with 10,000 pounds of strawberries, which was possible because strawberries are a high-density item. This pallet reduces handling costs, especially when full loads of strawberries are transported.

Airlines have developed containers which are lighter in weight and containers shaped to facilitate maximum use of the aircraft. Specialized containers have been designed, such as a wood-slat wire-bound crate, for shipments of calves in a jet freighter from New York to Milan. Due to ease of handling the calves in this container, a special freight rate was approved which resulted in about a two-thirds saving over the original rate for live animals.

Air carriers are selling triple corrugated containers in 4 sizes to shippers. Airlines belonging to the International Air Transportation Association give shippers discounts on rates of up to 12 percent on these containers when they are loaded with a minimum of 220 pounds and used in international flights. Thousands of these containers have been sold since the program began in January 1965. Use of these containers results in unitizing cargo, which simplifies handling and reduces cost.

Ground Handling

Although the airlines have made great

strides in material handling, they continue to strive for improvement. Their objective is to find ways to lessen the time required to unload a truck and push freight through the air terminal.

In 1964, several airlines put into service new air freight terminals, having what each considered the best in materials handling equipment. All had built-in plans for expansion. Another airline built a $7-million terminal to be occupied by the end of 1965. It has enclosed space to accommodate at 1 time 3 jet freighters and dock space for 24 trucks. Powered conveyor systems for servicing trucks can be extended into vans for quick loading and unloading. Automated cargo holding or storage systems include electronically controlled tow carts, power conveyors, and air pallet storage on power conveyors. In 1964, the airlines spent more than $40 million on new cargo handling equipment and 3 airlines spent more than $125 million in cargo terminal facilities at airports.

Power conveyors now in use can load the belly of a combination carrier plane in minutes. They can pick up, convey, and discharge loads up to 2,000 pounds. One man can move easily loads weighing more than 40,000 pounds with a small diesel-powered tug manufactured by a British firm. Tugs are used to transport shipments from ground receivers to planes.

Outlook for Air Transportation

Air ton-mileage has been increasing at an annual rate of about 20 percent and will continue to increase. Most air carriers are gradually replacing piston cargo aircraft with either "quick-change" passenger-cargo jets or all-cargo jets. This will permit heavier loading which reduces costs per ton-mile to the carrier; part of this saving probably will be passed on to shippers. Planes are getting bigger and plans are to make them even larger and capable of carrying heavier loads. Representatives of 1 of the companies manufacturing jets are teaming up with air freight salemen to sell space to fill these planes. Ground handling facilities will continue to improve and will contribute to further reduction carrier costs. New freight terminals are being constructed.

Shipper-carrier workshops are to be conducted in mid-1966, according to CAB's November 1965 announcement. This should establish a better relationship between carriers and shippers as well as acquaint the carriers with any special needs of the shippers.